V.3.2 FORECAST COMPONENT OPERATIONS

This Section summarizes the Operations available for use in the Forecast Component.

A detailed description of each Operation is in Section V.3.3.

Available Operations

The currently available Operations are:

Identifier	Description	System	1/
ADD/SUB	Add or subtract time series	BOTH	
ADJUST-H	Adjust stage	FCST	
ADJUST-Q	Adjust simulated discharge	BOTH	
ADJUST-T	Adjust tide	FCST	
API-CIN	OHRFC API rainfall-runoff model	BOTH	
API-CONT	Continuous API model	BOTH	
API-HAR	MARFC API rainfall-runoff model	BOTH	
API-HAR2	MARFC API rainfall-runoff model #2	BOTH	
API-HFD	NERFC API rainfall-runoff model	BOTH	
API-MKC	MBRFC API rainfall-runoff model	BOTH	
API-SLC	CBRFC API rainfall-runoff model	BOTH	
ASSIM	End of Operations to be re-executed by Assimilator Operation	FCST	
BASEFLOW	Baseflow simulation	BOTH	
BEGASSIM	Beginning of Operations to be re-executed by Assimilator Operation	FCST	
CHANGE-T	Change time series data time interval	BOTH	
CHANLEAK	Conceptual channel loss model		2/
CHANLOSS	Channel loss	BOTH	
CLEAR-TS	Clear time series	BOTH	
CONS_USE	Consumptive use model	BOTH	
DELTA-TS	Rate of change of time series	BOTH	
DWOPER	Dynamic wave routing	BOTH	
FFG	Flash Flood Guidance	FCST	
FLDWAV	Generalized flood wave routing	BOTH	
GLACIER	Glacier routing model	BOTH	
INSQPLOT	Instantaneous discharge plot	BOTH	
LAG/K	Lag and K routing	BOTH	
LAY-COEF	Layered coefficient routing	BOTH	
LIST-FTW	Fort Worth tabular time series display	BOTH	
LIST-MSP	Minneapolis tabular runoff display	BOTH	2/
LOOKUP	2 variable table lookup	BOTH	
LOOKUP3	3 variable table lookup	BOTH	
MEAN-Q	Mean discharge computation	BOTH	
MERGE-TS	Merge time series	BOTH	
MULT/DIV	Multiply or divide time series	BOTH	
MUSKROUT	Muskingum routing	BOTH	
NOMSNG	No missing value time series	BOTH	
PEAKFLOW	Peak flow comparison	CALB	
PLOT-TS	Plot time series	BOTH	
PLOT-TUL	Tulsa time series list and plot	BOTH	

Identifier	Description	System 1/
REDO-UHG	Reduced order unit hydrograph	3/
RES-J	Joint reservoir regulation model	BOTH
RES-SNGL	Single reservoir regulation model	BOTH
RSNWELEV	Rain-snow elevation computation	BOTH
SAC-PLOT	Sacramento type mean daily flow plot	CALB
SAC-SMA	Sacramento soil moisture accounting model	BOTH
SARROUTE	SSARR channel routing	BOTH
SET-TS	Set time series values	BOTH
SNOW-17	Snow accumulation and ablation model	BOTH
SNOW-43	State-space snow accumulation and ablation model	BOTH
SS_SAC	State-space Sacramento model	FCST
SSARRESV	SSARR reservoir regulation	FCST
STAGE-Q	Stage-discharge conversion	BOTH
STAGEREV	Stage review	FCST
STAT-QME	Mean daily discharges statistical summary	CALB
SUMPOINT	Time series summing point	BOTH
SWB-NILE	Simple water balance model	BOTH
TATUM	Tatum routing	BOTH
TIDEREV	Tide balance review	FCST
UNIT-HG	Unit hydrograph	BOTH
WATERBAL	Water balance summary	CALB
WEIGH-TS	Weight time series	BOTH
WY-PLOT	Water year mean daily flow plot	CALB
XIN-SMA	Xinanjiang soil-moisture accounting model	BOTH

Notes:

1/ CALB = Calibration System only
FCST = Forecast System only
BOTH = Calibration and Forecast Systems

2/ under development

3/ not included in current programs

Description by Operation Type

Identifier	Name	Description
Hydrometeorological Operations:		
RSNWELEV	Rain-snow elevation	Computes the elevation that separates rain and snow using freezing level and/or air temperature data
Snow Accumulation and Ablation Operations:		
SNOW-17	HYDRO-17 snow model	Snow accumulation and ablation model - uses air temperature as the only index to energy exchange

Identifier	Name	Description
SNOW-43	NWS-43 snow model	State-space version of the SNOW-17 model
Rainfall-Runoff Operations:		
API-CIN	OHRFC API model	Antecedent Precipitation Index (API) rainfall-runoff procedure used by the Ohio RFC
API-CONT	Continuous API model	Continuous, incremental Antecedent Precipitation Index (API) rainfall-runoff model - generates both surface and baseflow runoff
API-HAR	MARFC API model	Antecedent Precipitation Index (API) rainfall-runoff procedure used by the Middle Atlantic RFC
API-HAR2	MARFC API model	Revised version of the API rainfall-runoff procedure used by the Middle Atlantic RFC
API-HFD	NERFC API model	Antecedent Precipitation Index rainfall-runoff procedure used by the Northeast RFC
API-MKC	MBRFC API model	Antecedent Precipitation Index (API)rainfall-runoff procedure used by the Central Region
API-SLC	CBRFC API model	Antecedent Precipitation Index (API)rainfall-runoff procedure used in portions of the Colorado Basin RFC area
ASSIM/ BEGASSIM	Assimilator	Updates rainfall/runoff model states
SAC-SMA	Sacramento soil	Soil moisture accounting portion moisture accounting of the Sacramento Model
SS_SAC	Sacramento soil moisture accounting	State-space version of the soil moisture accounting portion of the Sacramento Model
SWB-NILE	Simple Water Balance	Based on the Water Balance component of the Nile Forecast System developed by the Technology Transfer Center of OH
XIN-SMA	Xinanjiang soil moisture accounting	Soil moisture accounting portion of the Xinanjiang Model used in

Identifier	Name	Description
		China
Temporal Distribution of Runoff (Convert Runoff to Discharge) Operations:		
UNIT-HG	Unit hydrograph	Generates an instantaneous discharge hydrograph from runoff values by using a unit hydrograph
Operations Accounting for Channel Losses or Gains:		
CHANLOSS	Channel loss	Accounts for losses or gains of water as a result of flow through the channel bottom and evaporation from the stream surface - channel bottom losses or gains are specified as a constant or as a percentage of the discharge and can vary seasonally
CONS_USE	Consumptive Use	Accounts for the impact of surface water irrigation on streamflow
Baseflow Generation Operations:		
BASEFLOW	Baseflow generation	Generates the baseflow contribution using a constant baseflow, baseflow that recesses at a constant rate or baseflow that recesses at a variable rate - for use with API-type rainfall-runoff models
Operations that Perform Basic Arithmetic Manipulations of Time Series Data:		
ADD/SUB	Add or subtract time series	Adds or subtracts one time series from another - data time intervals of the time series do not have to be the same
CHANGE-T	Change time series data time interval	Changes a time series with a of a given data time interval to a time series with a larger or smaller data time interval - also converts a mean daily time series to an instantaneous time series with a smaller data time

Identifier	Name	Description
		interval
CLEAR-TS	Clear time series	Sets all values in a given time series to zero
DELTA-TS	Rate of Change of series	Computes rate of change in time values in a time series (i.e., the difference between consecutive values) - used primarily to compute change in reservoir storage from a storage time series
LOOKUP	Table lookup - 2 variables	Generates a time series from another time series and a table that defines the relationship between the 2 variables
LOOKUP3	Table lookup - 3 variables	Generates a time series from other time series and a table that defines the relationship between the 3 variables
MEAN-Q	Computation of mean discharge	Computes mean discharge from instantaneous discharges for a specified data time interval (normal use is to compute mean daily discharge)
MERGE-TS	Merge time series	Merges data from multiple time series based on a priority order specified by the user
MULT/DIV	Multiply or divide time series	Multiplies two time series two together or divides one time series by the other
NOMSNG	No missing value time series	Generates a time series with no missing values from a time series with missing values
SET-TS	Set time series values	Sets all of the values in a time series to the specified value
SUMPOINT	Summing point	Computes a summed or mean time series at the beginning and end of the time increment
WEIGH-TS	Weight time series	Applies weighting factors to an unlimited number of input time series to produce a weighted output time series

Channel Routing Operations:

Identifier	Name	Description
ADJUST-T	Tide Adjustment	Applies maximum and minimum tide balances to a predicted time series
DWOPER	Dynamic wave routing	Routes flow using a dynamic wave model based on the complete one-dimensional St. Venant equations - features are included to handle a variety of conditions found on natural river systems
FLDWAV	Flood wave routing	Generalized flood routine model
GLACIER	AKRFC Glacier Routing	Routes runoff through a glacial system
LAG/K	Lag and K routing	Routes flow using the Lag K method - Lag and K values can be constant or variable
LAY-COEF	Layered coefficient routing	Routes flow using the layered coefficient method - this is the method used in the Sacramento Model
MUSKROUT	Muskingum routing	Routes flow using the Muskingum method with constant values for the routing coefficients
SARROUTE	SSARR routing	Routes flows using the SSARR method
TATUM	Tatum routing	Routes flow using the Tatum coefficient routing procedure
TIDEREV	Tide Balance Review	Creates and displays maximum and minimum tide balances for the period between STARTRUN and ENDRUN
Stage-Discharge Conversion Operations:		
STAGE-Q	Stage-discharge conversion	Converts stage to discharge and vice-versa using a single valued rating curve with either a log-log or hydraulic extension - also can use a dynamic model when there is a loop rating caused by changing discharge
Reservoir Operations:		
RES-J	Joint reservoir regulation	Simulates the operation of a single or a system of reservoirs

Identifier	Name	Description
RES-SNGL	Single reservoir regulation	Simulates the operation of a single reservoir under various modes of regulation
SSARRESV	SSARR reservoir regulation	Routes streamflows through lake storage and reservoirs under free flow or controlled flow modes
Operations to Plot Daily Discharge for Calibration Programs:		
SAC-PLOT	Sacramento-type mean daily flow plot	Similar to the WY-PLOT Operation except plots on a monthly basis - tabulates information from the SAC-SMA and SNOW-17 Operations
WY-PLOT	Water year mean daily flow plot	Plots an unlimited number of daily discharge time series on a water year basis - different plot scales can be used and Sacramento soil moisture accounting variables can be tabulated on the plot
Statistical Summary Operations for Calibration Programs:		
PEAKFLOW	Peak Flow Display	Produces a table and summary statistics of the observed and corresponding simulated instantaneous peak discharges
STAT-QME	Statistical summary - mean daily discharge	Computes a variety of statistics to compare simulated and observed mean daily discharge on a yearly and total run basis
Flow Adjustment Operations:		
ADJUST-Q	Adjust simulated discharge	Adjusts simulated flow to match observed values and blends between last observed value and future simulated discharges
General Plot Operations:		
PLOT-TS	Plot time series	Generates up to 6 plots which all use the same time scale - a variable number of time series can be included on each plot
PLOT-TUL	ABRFC operational plot	Plots an unlimited number of time series all with the same units and data time interval -

Identifier	Name	Description
		also tabulates values for up to 8 time series
Instantaneous Discharge Plot Operations:		
INSQPLOT	Instantaneous discharge plot	Plots an unlimited number of instantaneous discharge time series - runoff and rain+melt can be tabulated along the time scale
Tabular Displays:		
LIST-FTW	WGRFC tabular operational display	Tabulates data from a variety of time series - the data time interval and the portion of the run which is tabulated can vary from one time series to another
LIST-MSP	NCRFC tabulation API display	Tabulates time series and other information associated with an API type rainfall-runoff Operation
WATERBAL	Water balance summary	Tabulates moisture states, runoff components and water balance components for subareas and watersheds
Forecast Guidance Information:		
FFG	Flash flood guidance	Computes points defining the current rainfall-runoff relationship given snow and soil moisture conditions - used to compute the amount of rain needed to cause flash flooding on small streams